

Male description of *Coelotes nasensis* Shimojana 2000 (Araneae: Agelenidae) from Amami-ōshima Island, Japan

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Abstract — The male of *Coelotes nasensis* Shimojana 2000 is described for the first time on the basis of the topotypic specimen from Amami-ōshima Island in the Ryukyu Islands, southwestern Japan. The male specimen of the species is characterized by having a large and elongated median apophysis in palp. Furthermore, molecular analysis based on the mt-DNA COI region revealed that identity between a female topotype and a male specimen was highly similarity.

Key words — Coelotinae, taxonomy, DNA barcoding, COI

Introduction

Ryukyu Islands, southwestern Japan have a rich diversity of coelotine spiders, and 28 species have been described to date (Okumura et al 2009; World Spider Catalog 2018). *Coelotes nasensis* Shimojana 2000 is a medium-sized coelotine spider described from Amami-ōshima Island in the Ryukyu Islands, and only female specimens have been known up to the present. According to the original description, this species is characterized by having the epigyne resembling the face of a monkey, small and adjacent w-shaped epigynal teeth, and two retromarginal teeth on the chelicera (Shimojana 2000, 2003). In December 2017, the first author surveyed Amami-ōshima Island including the type locality of the species, and Kakeroma Island, located in the south of Amami-ōshima Island, collecting many unknown male specimens together with female specimens of *C. nasensis*. Therefore, the unknown specimens were suggested to be the male of *C. nasensis*, and we carefully performed the morphological analysis of the male specimens. Additionally, we conducted molecular analysis using female topotypes of *C. nasensis* and unknown male specimens, and tried to make clear the relationship between the males and females. Incidentally, precise taxonomic status of the genus *Coelotes* in many Japanese species should be reconsidered (Okumura et al. 2017), however we are following the original description of this species at the moment.

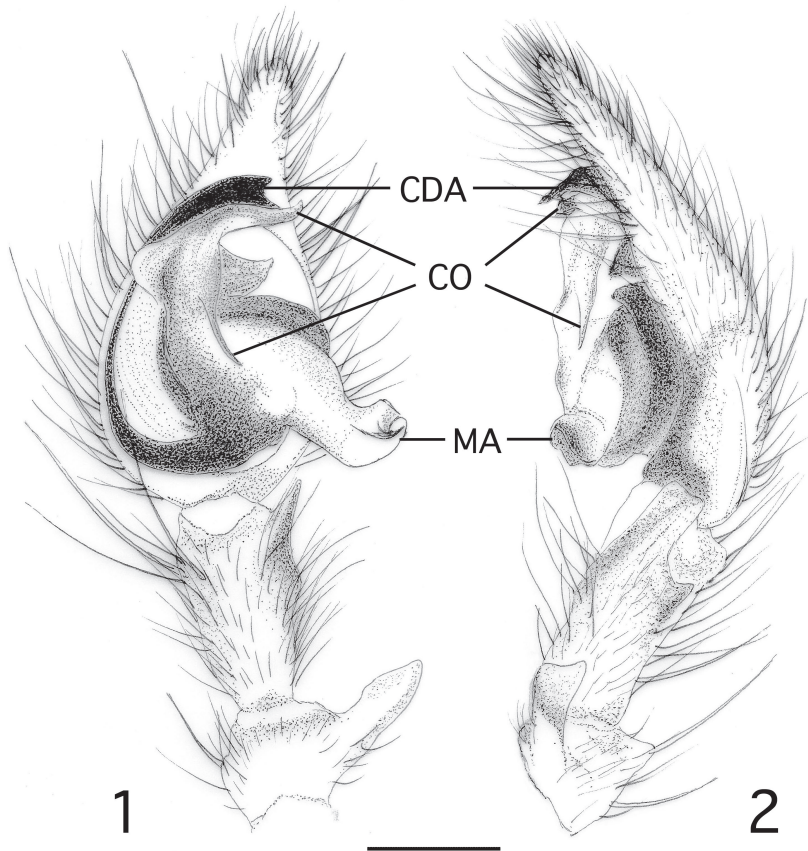
Materials and methods

Sampling and morphological examination

All the materials including female specimens of *Coelotes nasensis* and unknown male specimens in this study were collected from Amami-ōshima Island and Kakeroma Island, southwestern Japan. Examination and illustration were performed using an Olympus SZX-7 stereomicroscope. Measurements of respective body parts were done using a micrometer mounted on an ocular lens. All measurements are given in millimeters. Leg measurements are given as total length (femur, patella & tibia, metatarsus, tarsus). The abbreviations used in this paper are as follows: ALE, anterior lateral eye; AME, anterior median eye; LTA, lateral tibial apophysis; MOA, median ocular area; PLE, posterior lateral eye; PME, posterior median eye; RTA, retrolateral tibial apophysis. The voucher specimens will be deposited in the collection of the Department of Zoology, National Museum of Nature and Science, Tsukuba (NSMT), Japan.

Molecular analysis

Four specimens of obtained samples were used in the molecular analysis. After that, comparison of the base sequences was carried out using the other coelotine species. The details of the samples are shown in appendix. Mitochondrial cytochrome oxidase subunit I (mt-COI) were amplified using the primer combination COI-1628: 5' - ATA ATG TAA TTG TTA CTG CTC ATG C - 3' (Vandergast et al. 2004) with COI-Nancy: 5' - CCC GGT AAA ATT AAA ATA TAA ACT TC - 3' (Vandergast et al. 2004). Details of DNA extraction, polymerase chain reaction and sequencing, refer to



Figs. 1–2. *Coelotes nasensis* Shimojana 2000. Male palp, ventral view (1); same, retro-ratral view (2). Abbreviations: CDA, conductor dorsal apophysis; CO, conductor; MA, median apophysis. Scale bar: 0.5mm.

Okumura et al 2016. The DNA sequences newly obtained in this study have been deposited with the International Nucleotide Sequence Database Collaboration (INSDC) through DNA Data Bank of Japan.

Results of molecular analysis

As a result of amplification and sequencing, mt-COI partial sequences of 583 or 586 bp were obtained, and the male and female specimens were compared with each other. P-distance (the number of base differences per total number of analyzed bases) of unknown male specimens from female specimens of *C. nasensis* was from 0.017 to 0.050. Incidentally, the values compared with other coelotine species data that inhabit the same island were as follows; 0.107 from female of *Coelotes oshimaensis* (Shimojana 2000), and 0.142 from female of *Coelotes akakinaensis* (Shimojana 2000). Based on the above, we judged that the male specimens newly obtained are *Coelotes nasensis*.

Coelotes nasensis Shimojana 2000
(Japanese name: Nase-yachigumo)
(Figs. 1–2)

Coelotes nasensis Shimojana 2000, pp. 199–200, figs. 30–35; Shimojana 2003, pp. 27–28, fig. 2-23; Okumura et al. 2009, p. 194, figs. 2-2-33-323–326

Materials examined. All specimens collected by the first author. Amami-ōshima Island: Sedome, Tatsugo Town, Ōshima County, 1 male and 1 female, 27 December 2017; Ōaza-chinase, 250m alt., Naze, Amami City, 5 males and 12 females, 28 December 2017; Ōaza-ishi-hara, 270m alt., Sumiyō Town, Amami City, 4 females, 28 December 2017; Ongachi, Yamato Village, Ōshima County, 2 males and 3 females, 30 December 2017; Yuwan, 180m alt., Uken Village, Ōshima County, 1 male and 2 females, 30 December 2017; Ōaza-yakugachi, Sumiyō Town, Amami City, 2 females, 30 December 2017; Ōaza-asato, Naze, Amami City, 5 males and 16 females, 31 December 2017; Ōaza-kominato, Naze, Amami City, 5 males and 16 females, 31 December 2017; 9 males and 22 females. Kakeroma Island: Setake, 190m alt., Setouchi Town, Ōshima County, 2 males and 2 females, 29 December 2017; Nishiamuro, Setouchi Town, Ōshima County, 1 female, 29 December 2017; Hyō, 140m alt., Setouchi Town, Ōshima County, 1 female.

Diagnosis. Male of *Coelotes nasensis* can be distinguished from all the other Japanese coelotine spiders by having a large and laterally elongated median apophysis and the presence of a conductor dorsal apophysis situated closely to the conductor.

Description of male. Total length 8.0, carapace 4.4 long, 2.9 wide; abdomen 3.6 long, 2.0 wide; sternum 2.2 long, 1.6 wide. Eye sizes; AME 0.12, ALE 0.21, PME 0.15, PLE 0.15. Distances between eyes; AME-AME 0.04, AME-ALE 0.04, PME-PME 0.09, PME-PL 0.17, AME-PME 0.11, ALE-PL 0.05. MOA; anterior width 0.28, posterior width 0.39, length 0.38. Leg measurements: I: 13.0 (3.5, 4.3, 3.2, 2.0); II: 12.1 (3.3, 3.8, 3.2, 1.8); III: 11.0 (3.0, 3.5, 3.0, 1.5); IV: 14.7 (3.8, 4.6, 4.2, 2.1).

Chelicera: promargin with three teeth, and retromargin with two.

Palp (Figs. 1, 2): tibia twice as long as patella, patellar apophysis broad, LTA small, RTA large and broad, cymbial furrow about one-fifth of cymbial length, embolus flagelliform and short, conductor consisting of two projections, anterior part short and slightly curved, posterior one needle-shaped and elongated obliquely downward, conductor dorsal apophysis arcuate and slightly shorter than a conductor, median apophysis large, elongated to the lateral side of cymbium obliquely, and the tip bend.

Coloration: carapace brown with blackish brown radial flecks, dorsum of abdomen grayish brown with indistinct chevrons and venter grayish brown with black specks, sternum brown, chelicerae blackish brown, maxillae and labium brown, legs brown with ring flecks.

Remarks: The male of *Coelotes nasensis* is similar to the female in body size and color. In regards to the specimens obtained in this study, the body length of male specimens

was 6.9 mm to 8.4 mm, and that of the female was 6.3 mm to 10.9 mm. Coloration and markings of females were almost the same as those of the males mentioned above. The number of retromarginal teeth on the chelicera was two in both sexes.

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Appendix. Samples with collection localities and INSDC accession numbers used for molecular analyses.

Species	sex	Collection localities	Accession No.
<i>Coelotes nasensis</i>	male	Ōaza-chinase, Naze, Amami City, Kagoshima Pref.	LC382417
<i>Coelotes nasensis</i>	male	Ōaza-chinase, Naze, Amami City, Kagoshima Pref.	LC382418
<i>Coelotes nasensis</i>	female	Ōaza-chinase, Naze, Amami City, Kagoshima Pref.	LC382419
<i>Coelotes nasensis</i>	female	Ōaza-chinase, Naze, Amami City, Kagoshima Pref.	LC382420
<i>Coelotes oshimaensis</i>	female	Sedome, Tatsugo Town, Ōshima County, Kagoshima Pref.	LC382465
<i>Coelotes akakinaensis</i>	female	Sato, Kasari Town, Amami City, Kagoshima Pref.	LC382466